NAME: _____

# Birds and Polynomial Functions

Wildlife Biologists tag/band animals to collect data which can be used to create mathematical models to graphically represent or predict the growth or decline of animal populations. A decline in population could be the result of habitat loss, genetic loss, or an environmental condition. While collected data can help to determine levels of endangerment for animals and speed of action to be taken to slow down the rate of extinction, data can also be collected from certain "indicator species", such as birds, to determine if a decline in population is the onset of a disease outbreak that could impact the overall health of the human population.

IF the following polynomial function

$$f(x) = -x^3 + 10x^2 - 4x + 20$$

models the population of a particular species of bird in the Midwest where x represents is the number of years since 2016, use the above function to analyze the situation.

a. Graph

b. How many of birds of this type were in existence in 2016?

c. When will/did the bird population reach its maximum?

d. What was the maximum population reached by this species of bird?

e. When will/did this particular bird become extinct?

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Teacher Notes for Potential Extensions

Additional Questions:

1. What are endangered species?
   Resources:
   https://www.environmentalscience.org/birds-environmental-indicators,
   https://www.nationalgeographic.org/encyclopedia/endangered-species/

2. Why is it important to save endangered species?
   Resource: https://www.gviusa.com/blog/why-should-we-save-endangered-species/

3. What birds or other animals are endangered in Illinois or in our specific county?
   Resource: https://www2.illinois.gov/dnr/ESPB/Pages/default.aspx

Additional Notes Direct from other Resources:

1. Data collected on crows helped identify the West Nile Virus which impacted the health of people across the world including the United States.
   https://www.chicagotribune.com/suburbs/daily-southtown/ct-sta-bird-banding-st-0916-20190913-v27ep6tpc5ad7chnifltkrkely-story.html

2. Anyone can help track birds by reporting a banded bird, dead or alive to the U.S. Geological Survey at https://www.usgs.gov/centers/pwrc/science/bird-banding-laboratory?qt-science_center_objects=0#qt-science_center_objects

3. Colored bands or tags, which can be plastic or metal, help provide information about a bird. These tags can contain “radio transmitters, nanotags, geolocators, cellular tracking technologies, GPS tags, and satellite transmitters”.
   http://www.briloon.org/uploads/Library/item/500/file/Lo%20Res%20Center%20for%20Ecology%20Booklet%20080116.pdf

4. Wildlife biologists or researchers can work in a lab, work out in the field using nets and banding tools, or work in other ways such as flying a plane to monitor an area, “rappelling down a frozen waterfall to reach a cave where bats hibernate, or carrying a canoe for miles to remote lakes”.
   http://www.briloon.org/uploads/Library/item/500/file/Lo%20Res%20Center%20for%20Ecology%20Booklet%20080116.pdf

Additional Activities:

Buddy Banding - https://www2.illinois.gov/dnr/education/Documents/1B2HBuddyBanding.pdf

Invite a Wildlife Biologist or Bird Bander to your class.

Illinois Math & Science Academy
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